Perceived Benefits and Barriers of Handheld Computers in Clinical Practice

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Background: Handheld computers play an increasing role in improving healthcare services by making the information available at the point of care. There is not enough evidence regarding the usage of handheld computers by healthcare professionals in developing countries.

Objectives: This study investigated the benefits and barriers of using handheld computers in clinical practice in a developing country, Iran.

Patients and Methods: This qualitative study was conducted using a semi-structured interview protocol. The study subjects were selected using the purposive snowball sampling method. In-depth interviews were carried out by 21 medical interns and residents from May through September 2011. NVivo Software was used to codify and analyze the data.

Results: The most important benefits of using handheld computers included easy access and instant delivery of health information, medical errors reduction, access to evidence-based clinical information, and improving the clinical decision makings and treatment quality. Three limitation categories of usage were also identified upon data analysis, related to handheld computers, individual barriers, and external limitations.

Conclusions: Handheld computers are useful devices for accessing up-to-date and evidence-based information in clinical practice to serve patients better. Healthcare authorities in developing countries should provide more support and considerations to reduce limitations of handheld computers usage in healthcare settings.

Keywords: Handheld Computers; Health; Needs; Cellular Phone; Developing Country, Iran

1. Background

Healthcare professionals such as physicians need suitable tools for accessing medical information at the point of need. Handheld computers provide healthcare professionals with the ability to access, manage, and share clinical information at the point of care, which are critical and help physicians better serve the patients (1). However, one may find personal digital assistants (PDAs) and smartphones difficult to use due to text entry speed, size of keyboard and screen, and security problems, as Hauser suggested (2). Previous publications showed that healthcare professionals have perceived the benefits of handheld computers usage in clinical practice and there has been an increase of use of handheld computers in medical settings (3, 4). The use of handheld computers is also a growing trend in Iran like other countries for accessing medical applications, decision support resources such as up-to-date database, drug references, electronic books, etc. (5, 6). Our literature review indicated that few studies have focused on the benefits and barriers of using handheld computers in clinical practices in developing countries. Furthermore, for exploring what interns and residents currently think about PDAs and smartphones, our literature review failed to find any evidence of previous studies on this topic in developing countries.

2. Objectives

The aim of this study was to realize the advantages and limitations of using handheld devices in clinical practice among medical interns and residents in Iran, to make healthcare managers aware of the importance of handheld computers and their usage limitations in medical settings.

3. Patients and Methods

In this qualitative research two main teaching hospitals, Imam-Khomeini and Hazrat-e-Rasool, affiliated to Iran University of Medical Sciences, were selected. A total of 21 participants, including 11 Interns and 10 residents (14 males and 7 females) who used handheld computers in clinical practice from May through September in 2011, were interviewed.

3.1. Sampling and Data Collection

Purposive sampling method was used to identify potential and relevant recruits. Using this method data collection continued until no new data emerged from the interviews; then, the main concepts in the interviews were identified and established (6). Semi-structured interviews were applied to allow the participants to voice their opinions and relate their experiences about handheld computers. Verbal consents were obtained at the time of the survey.

3.2. Data Analysis

Audio tape recording was used to record each interview and then they were transcribed for data analysis. NVivo, qualitative data analysis software, was applied for coding the collected data.

4. Results

According to our results, handheld computers have become useful and popular devices in medical practices and physicians' clinical practices (Table 1).

4.1. Easy Access and Instant Delivery of Health Information

Easy and instant access to health-related information was regarded as the first benefit of using handled computers in clinical practice. Instant access to such information has affected rapid adoption of handheld computers in medical settings, which is followed by some other advantages. Handheld computers have permitted the storage of many e-books, thus avoiding the need to carry heavy and bulky hardcopies. This has benefited the participants with reducing the risk of drug prescription and medical errors. Participants, by possessing decision supporting resources such as up-to-date, dosing calculators and drug references, were able to reduce the risk of these types of errors. The participants could improve their clinical communication workflows in medical settings and be aware of new findings, conferences and events. Moreover, these tools were suitable memory assistants when they forgot essential information, as these tools made information accessible when required.

4.2. Other Benefits

Handheld computers improved clinical decision makings, treatment quality and patient safety by accessing evidence-based medical information, which helped the clinicians to find the most effective treatment available in all fields of medical knowledge. These devices helped the physicians in proper medication prescription, which could reduce treatment and drug expenditures. Easy access to clinical information and even instant access to their colleagues in emergency situations enhanced the physicians' self-confidence and performances.

The analysis of participants' comments on the barriers led to identifying 14 main barriers and limitations, which were divided into three main categories (Table 2).

Table 1. Benefits of Using Handheld Computers in Clinical Practice

Benefits	Frequency
Easy access and instant delivery of health information	13
Portable and versatile information storage	10
Reducing medical errors	9
Keeping physicians up-to-date; current awareness	5

Table 2. Limitations and Barriers to Use of Handheld Computers in Clinical Practice

Limitations and Barriers	Frequency
Limitations related to handheld computers	
Software difficulties	15
Hardware difficulties	5
High costs	5
Individual barriers	
Mental dependency	12
Lack of computer skills	5
Lack of interest to information technology	4
Computer and information technology anxiety	
Not being applicable in emergency situations	3
Dependency to previous knowledge and experiences	2
Not feeling the need for it	2
Physician's reliance on memory	2
External limitations	
Lack of training and unfamiliarity with handheld computers	10
Barriers related to social beliefs	7
Lack of organizational support	3

4.3. Limitations and Barriers Related to Handheld Computers

The main problem reported was software difficulties which included handheld computers low support of medical applications, low speed of loading applications, and lack of nation-wide applications. Hardware difficulties included battery weakness, uncomfortable sizes and heavy weights. Costs were another barrier reported by five participants.

4.4. Individual Barriers

Mental dependency to handheld computers was an obstacle, which had occasionally made the participants reluctant and lazy to memorize some basic and useful information, as they thought those information would be accessible via handheld computers when needed. Lack of enough computer knowledge, lack of interest to information technology (IT), computer and IT anxiety, being time consuming and confusing in emergency situations, physicians' reliance on memory, shortage in complementary tools and not feeling the need for technology were other obstacles to using handheld computers. Two participants also declared that handheld computers were assistant tools and using them depended to previous clinical knowledge experiences of physicians.

4.5. External Limitations

Lack of training and unfamiliarity with handheld computers, lack of organizational support, and barriers related to social beliefs were other obstacles. Some individuals might negatively believe that physicians who use handheld computers for patient care lack enough medical knowledge. This was mentioned as a barrier for the use of handheld computers in clinical practices.

5. Discussion

Developing countries are in the first period of integrating information technologies such as handheld computers into healthcare settings. Findings of this study would give healthcare authorities and professionals a better attitude and a clearer understanding toward the importance of PDAs and smartphones in the medical field. The major benefit of handheld computers included easy access to health-related information. Some findings of the current study were consistent with the previous literature. For example, immediate and unlimited access to medical information, self-confidence improvement, access to drug databases and books and the ability to enhance healthcare team communication were the top benefits of PDA usage in clinical practices (7, 8). This may be argued that since in developing countries the use of information technologies in healthcare setting is in its childhood, the advanced usages of handheld computers, mentioned in some previous studies, including patient data collection and e-prescribing, were not yet generalized among our participants. The interviews revealed many limitations related to software difficulties, mental dependency, lack of training, and unfamiliarity with handheld computers. A number of other studies have also reported these barriers, including lack of interest, organizational and usability barriers, inadequate technology support, not feeling the need or motivation, and fear of dependency to handheld computers (1, 8, 9). However, less literature was found about social beliefs as a barrier to use of handheld computers. One may argue that this barrier was due

to the unpopularity and unfamiliarity of handheld computers in Iranian medical settings. This may be argued that these obstacles were related to many factors including socio-cultural characteristics of each community. For instance, while users were concerned about factual contents, technical reliability and device dependency in one study (8), device dependency was a concern among our population.

To conclude, handheld computers are effective devices for accessing health-related information for physicians. The participants of this study were generally satisfied with the use of handheld computers in their daily and job activities. Therefore, it is recommended that healthcare managers in developing countries schedule to predispose the use of mobile technologies in medical settings to improve patient safety. Training programs and workshops could help physicians to get acquainted with the benefits of using handheld computers in clinical practices. Health authorities are suggested to provide physicians with spiritual and financial supports and the necessary information technology infrastructures.

Authors' Contributions

Iman Tahamtan and Shahram Sedghi carried out the study design and manuscript draft. Iman Tahamtan performed data collection and data analysis. Both authors read and approved the final manuscript.

References

1. Lu YC, Lee JK, Xiao Y, Sears A, Jacko JA, Charters K. Why don't physicians use their personal digital assistants? *AMIA Annu Symp Proc.* 2003:405–4.
2. Hauser SE, Demner-Fushman D, Jacobs JL, Humphrey SM, Ford G, Thoma GR. Using wireless handheld computers to seek information at the point of care: an evaluation by clinicians. *J Am Med Inform Assoc.* 2007;**14**(6):807–15.
3. Chatterley T, Chojecki D. Personal digital assistant usage among undergraduate medical students: exploring trends, barriers, and the advent of smartphones. *J Med Libr Assoc.* 2010;**98**(2):157–60.
4. Phua J, Lim TK. How residents and interns utilise and perceive the personal digital assistant and UpToDate. *BMC Med Educ.* 2008;**8**:39.
5. Safdari R, Jebraeily M, Rahimi B, Doulani A. Smartphone medical applications use in the clinical training of medical students of UMSU and its influencing factors. *EurJ Exp Biol.* 2014;**4**(1):633–7.
6. Sedghi S , Tahamtan I, Ebadi Fard Azar F. Exploring PDA Usage

by Iranian Residents and Interns: A Qualitative Study. *Int J Hosp Res.* 2012;**1**(2):91–6.

7. Altmann TK, Brady D. PDAs bring information competence to the point-of-care. *Int J Nurs Educ Scholarsh.* 2005;**2**:Article 10.

8. Axelson C, Wardh I, Strender LE, Nilsson G. Using medical knowledge sources on handheld computers--a qualitative study among junior doctors. *Med Teach.* 2007;**29**(6):611–8.

9. Perez BA, von Isenburg MA, Yu M, Tuttle BD, Adams MB. Exploring the impact of tablet computers on medical training at an academic medical center. *J Med Libr Assoc.* 2013;**101**(2):154–7.